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Dental Anthropology of Central-Southern, Iron Age Italy: The Evidence of Metric Versus Nonmetric Traits

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ABSTRACT Discrete and metric dental traits are used to assess biological similarities and differences among 13 bioarchaeological populations located on each side of the Apennine mountains in central-southern Italy and dated to the first millennium BC. An initial hypothesis, that the mountain chain might provide a significant geographical barrier for population movement (resulting in greater biological affinities among those groups on the same side), is not supported. Instead, the samples appear to cluster more on the basis of time than geography. Archaeological evidence, however, supports an association between populations on opposite sides of the mountains and thus is in accord with the dental data. As anticipated, discrete dental traits appear to be more useful than metric dental traits in assessing such population affinities. This research represents a beginning to a better comprehension of the complexity of the biological and cultural dynamics of Italian populations during recent millennia. Am J Phys Anthropol 107:371–386, 1998.

Throughout historic times, the Italian peninsula has been visited by numerous populations interested in expanding their influence in the Mediterranean basin. Although such migrations of populations (e.g., Celts, Greeks) into this region are well documented, much less is understood regarding population movements within the region during times prior to written records. An understanding of these population movements is made even more interesting by the peculiar shape and geography of the region, particularly in central and southern Italy. The long and narrow peninsula is divided by the Apennine mountain chain, which may have represented a significant barrier between the eastern and western sides. These areas may have undergone different cultural evolution as a partial result of possible geographic isolation (Barker, 1984). For these reasons, a comparison between the populations from each side of the Apennines is interesting from both a biological and cultural perspective.

In this study, discrete and metric dental traits are used to assess biological similarities and differences among several populations dating to the first millennium BC and located on each side of the mountains in central-southern Italy. One of the main reasons for focusing on the dentition is purely practical: teeth are often the only available

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remains from these protohistoric Italian skeletal samples. Because of geological, chemical, and taphonomic reasons, bones are often so poorly preserved that a reliable anthropological analysis is not possible. Thus, sample size is greatly enhanced through the use of dental material.

Fortunately, however, teeth are also among the most reliable biological indicators available in assessing skeletal population affiliations. This is partially the result of studies which suggest a strong genetic component to tooth morphology (e.g., Moorrees, 1962; Berry, 1978; Biggerstaff, 1973, 1979; Kolakowski et al., 1980; Scott and Potter, 1984; Nichol, 1989; Townsend et al., 1990, 1992). Similarly, variation in tooth size appears to be heavily influenced by genetic factors (Alvesalo, 1971; Alvesalo and Tigerstedt, 1974; Garn et al., 1968; Moorrees and Reed, 1964; Salvo et al., 1972; Townsend and Brown, 1983). Thus, the apparently lesser influence of environmental conditions on dental traits relative to most skeletal features makes teeth an excellent data source regardless of the aforementioned benefit of sample sizes.

Nonmetric dental traits have been especially useful in reconstructing patterns of population affiliations spanning wide geographical areas and long periods of time, especially in Asian and American groups (Dahlberg, 1963; Turner, 1971, 1976, 1985b, 1987, 1990, 1992; Perzigian, 1976; Turner and Bird, 1981; Lukacs, 1984, 1987; Brace et al., 1989). Much less information, however, is available for European, African, and Middle-Eastern populations (Carbonell, 1963; Wajeman and Levy, 1979; Calcagno, 1986a; Irish and Turner, 1990; Turner and Markowitz, 1990). In addition, few papers have ever been published on microdifferentiation from relatively restricted areas (Lukacs, 1983; Bhasin et al., 1985; Sofaer et al., 1986; Coppa and Vargiu, 1990; Hemphill et al., 1991; Coppa et al., 1995; Haydenblit, 1996). Not surprisingly then, few standardized data are available from the Italian peninsula (Coppa and Macchiarelli, 1982; Macchiarelli and Bondioli, 1986; Macchiarelli and Sperduti, 1994; Macchiarelli et al., 1995; Mallegni et al., 1985).

MATERIALS AND METHODS

Sample

Dental metric and nonmetric traits from 13 Iron Age samples from central-southern Italy are compared (Fig. 1). Each of these 13 samples is derived from one or more sites dated within the time period of the ninth to second century BC. The samples are assigned as belonging to the A (early ninth to eighth century BC), B (middle seventh to fifth century BC), or C (late fourth to second century BC) phases of the Iron Age, with some necropoles spanning the entire time frame (Table 1). Populations located on the west side of the mountains are combined into two Etruscan samples (B and C) north of Rome, three Latini samples (A, B, and C) located near Rome, and three Campani samples (A, B, and C) located south of Naples. The remaining five samples are located in the high plains east of the mountains and include Piceni (B and C), Montani (A/B), Sanniti (B), and Sulmona (C). A total of 8,836 teeth, belonging to 1,114 individuals, was analyzed (Table 1).

Data collection and analysis

A total of 59 discrete dental traits was scored using the Arizona State (ASU) system (Turner et al., 1991), with only one exception.[1] The aim of this system is to allow the direct assessment of traits with increased intra- and interobserver reliability. Only those traits suggested in past studies of biological affinities to be unaffected by attrition, easily observed, less influenced by environmental factors, and useful characteristics of populations and that exhibited little or no sexual dimorphism are used in this system. Of the 8,836 teeth analyzed, not all possible variables per tooth could be scored in each case (e.g., attrition may have prohibited measurement of a nonmetric trait on the lingual surface, while a buccally located trait may have still been reliably recorded). The majority of traits are classified according to degree of expression, using Turner's

[1]A recently described feature, referred to as the mesial bending ridge, is commonly found in Italian populations (Pinto-Cisternas et al., 1995) and was therefore added to the ASU system. Because of the lack of a clear definition of different degrees of expression, it was scored as either present or absent.

Fig. 1. Map of central-southern Italy depicting the geographic location of samples comprising this analysis.

TABLE 1. List of the samples, their acronyms, number of teeth, and individuals analyzed

Samples	Acronyms	Number of teeth	Number of individuals
Ancient Etruscans	ETB	500	95
Recent Etruscans	ETC	691	102
Archaic Latini	LAA	239	33
Ancient Latini	LAB	283	41
Recent Latini	LAC	591	94
Ancient Piceni	PCB	1,128	136
Recent Piceni	PCC	1,980	211
Montani	MON	377	40
Sulmona	SUL	349	52
Sanniti	SAN	1,344	163
Archaic Campani	CAA	456	65
Ancient Campani	CAB	265	28
Recent Campani	CAC	633	54
Total		8,836	1,114

(1985a) expression count method, which may also be condensed into a simple presence or absence dichotomy. In addition, some traits can be recorded only as present or absent due to a lack of distinguishable degrees of variation. Whenever antimeres varied in expression, the one showing the higher degree of expression of each trait was chosen, according to Turner and Scott (1977), who suggest that the higher expression better reflects the genetic potential of the trait.

Metric traits consist of mesio-distal (M-D) and bucco-lingual (B-L) diameters, measured perpendicular to each other as described by Frayer (1978) using a 0.1 mm digital Mitutoyo thin-point caliper. Teeth were excluded from the analysis whenever there was significant attrition or destruction of the tooth surfaces. However, even with this precaution, because interproximal wear can alter M-D diameters, and more importantly because B-L diameters exhibit lower amounts of intraobserver measurement error, only B-L diameters are relied upon in

this analysis for increased measurement accuracy. In situations where both antimeres were present, the mean value was calculated between the two antimeric teeth for each diameter (see Calcagno, 1986b, 1989).

An assessment of the relationships between populations, using both metric and nonmetric data, was then conducted using factor correspondence analysis (FCA), a variant of principal components analysis (Benzecri, 1970). A major advantage of this technique is that populations and dental variables are represented simultaneously with respect to the same axes in multidimensional space, thereby permitting visual interpretation of dental differences among populations and the relative participation of each dental variable in the dispersion (Greenacre and Degos, 1977). Although some traits may be interrelated, in a phenetic analysis the best classification is based upon as many traits as possible (Avise, 1994). Correspondence analysis has been used in numerous studies attempting to discern and represent anthropological distances among populations (e.g., Greenacre and Degos, 1977; Schneider, 1986; Sciulli, 1990; Kitagawa et al., 1995; Manzi et al., 1997).

RESULTS

Tables 2 and 3 (maxillary and mandibular dentitions, respectively) report the frequency of each trait for each sample based on the presence or absence of each trait. Tables 4 and 5 show the frequency of expression of the same traits according to the expression count method (strictly dichotomous—i.e., present or absent—traits are not relisted in Tables 4 and 5 since the data are the same as in Tables 2 and 3). Table 6 reports the mean values of the bucco-lingual diameters, also for each of the 13 samples.

Figure 2 depicts the relationships among all samples based upon the first five axes of a factor analysis of the nonmetric traits. In relation to geographical differences alone, the results are rather unexpected. For example, the top cluster groups three samples (LAA, MON, and CAA) that are more related by time than geography. These are the only three samples that consist entirely (LAA, CAA) or at least partially (MON) of material dated to the earliest time period, and they are located on both sides of the mountains. A similar pattern of time but not geography is found at the bottom of this dendrogram. The lowest two populations (SUL and CAC) are from different sides of the mountains, but both belong to the C (or most recent) time period. Similarly, the tight cluster of two populations (SAN and CAB) seen just above these are again on opposite sides of the mountains, but each is dated to the B (or middle) time period. In between the samples already mentioned is a cluster of the remaining six groups, three from each side of the mountains and all belonging to the B and C time periods. In particular, a tight clustering between the two Etruschi and two Piceni samples can be noted. Thus, rather than sorting out according to geography, the data appear to cluster according to time.

Variables which contribute most to the first axis include mandibular I2 shovel-shape and maxillary M2 cusp 5 (represented highly in LAA and MON) as well as mandibular M1 trigonid crest (most evident in CAC and SUL, while completely absent in LAA, MON, CAA, and CAB). Mandibular M1 cusp number, maxillary I2 mesial bending ridge, and maxillary P3 root number contribute most to the second axis, while the greatest discriminating traits of the third axis include mandibular M1 cusp 7, lower canine distal accessory ridge, mandibular M1 deflecting wrinkle, and maxillary I1 interruption groove.

When these relationships are depicted a different way and examined on the basis of only two axes (and with less of the variation explained), a similar pattern exists (Fig. 3). One difference is that MON seems more isolated from all groups, which may perhaps be in part due to its chronological mixture of A and B materials.

A similar analysis based upon metric traits unfortunately does not help to clarify these populational relationships (Fig. 4). Instead, a somewhat bewildering array of clusters appears. For example, at the top of the dendrogram, the first five populations that are relatively tightly clustered (CAA, PCC, CAC, SAN, and ETC) represent both sides of the mountains and all three time periods.

TABLE 2. *Frequency (in %) and sample size (N) of maxillary nonmetric dental traits*[1]

		LAA		LAB		LAC		ETB		ETC		PCB		PCC		CAA		CAB		CAC		SUL		SAN		MON	
Trait	Dichotomies[2]	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
I1 shovel shape	3–6/0–6	0.0	9	0.0	6	5.3	19	0.0	6	15.4	13	5.4	37	10.7	56	15.4	13	0.0	6	5.3	19	0.0	12	3.2	31	20.0	10
I2 shovel shape	3–7/0–7	30.0	10	37.5	8	10.3	29	11.1	9	28.6	21	16.7	48	19.3	83	5.6	18	63.6	11	30.4	23	10.0	10	11.3	53	14.3	14
I1 double shoveling	2–6/0–6	12.5	8	0.0	5	0.0	19	16.7	6	9.1	11	15.6	32	0.0	41	14.3	14	0.0	7	4.8	21	8.3	12	3.3	30	0.0	9
I2 double shoveling	2–6/0–6	11.1	9	14.3	7	0.0	23	0.0	10	0.0	19	2.9	34	3.4	58	0.0	19	0.0	9	0.0	25	9.1	11	2.2	46	0.0	14
I1 interruption groove	+/0, +	40.0	10	40.0	5	20.0	10	33.3	9	53.8	13	41.7	36	36.4	44	50.0	18	28.6	7	23.5	17	7.7	13	25.0	32	46.7	15
I2 interruption groove	+/0, +	66.7	9	75.0	8	63.6	22	54.5	11	70.8	24	77.5	40	65.8	73	63.2	19	90.9	11	30.4	23	58.3	12	65.5	58	64.7	17
I2 mesial bending	1/0–1	41.7	12	66.7	12	51.7	29	28.6	14	34.5	29	72.4	58	74.5	102	30.4	23	53.8	13	34.6	26	30.8	16	31.3	67	10.5	19
I1 tuberculum dentale	2–6/0–6	58.3	12	42.9	7	73.7	19	41.7	12	42.9	21	59.5	42	47.9	73	52.9	17	57.1	7	12.5	24	35.7	15	76.9	39	64.3	14
I2 tuberculum dentale	2–6/0–6	66.7	9	42.9	7	65.4	26	50.0	10	43.5	23	62.2	45	57.5	80	65.0	20	53.8	13	24.0	25	60.0	10	50.0	50	58.8	17
C tuberculum dentale	2–6/0–6	61.5	13	38.5	13	69.2	39	68.4	19	51.9	27	60.9	46	43.2	88	45.5	22	50.0	12	38.7	31	16.7	14	51.7	60	56.5	23
C DAR[3]	2–5/0–5	33.3	9	62.5	8	70.4	27	81.8	11	58.3	12	73.0	37	66.1	59	92.9	14	60.0	5	66.7	15	63.6	11	74.3	35	57.1	14
P3 cusp number	1/0–1	8.3	12	15.4	13	8.3	36	0.0	21	13.8	29	13.5	37	7.9	63	9.5	21	15.4	13	0.0	36	10.5	19	8.9	56	15.8	19
P4 cusp number	1/0–1	11.1	9	18.2	11	14.8	27	22.2	18	4.5	22	6.5	31	14.0	43	23.1	13	16.7	12	2.6	38	0.0	10	11.1	54	29.4	17
M1 metacone	2–5/0–5	100.0	19	100.0	24	100.0	54	100.0	39	100.0	43	100.0	96	100.0	160	100.0	45	100.0	23	100.0	38	100.0	29	100.0	107	100.0	31
M2 metacone	2–5/0–5	100.0	21	100.0	25	100.0	46	100.0	38	100.0	41	100.0	72	99.2	125	100.0	37	100.0	24	100.0	42	100.0	26	100.0	99	100.0	29
M3 metacone	2–5/0–5	100.0	12	100.0	17	100.0	44	100.0	23	100.0	25	97.9	48	100.0	79	100.0	23	100.0	13	100.0	30	100.0	12	100.0	41	100.0	20
M1 hypocone	2–5/0–5	100.0	18	100.0	22	100.0	52	97.4	39	100.0	43	100.0	94	100.0	152	100.0	42	100.0	22	100.0	37	100.0	28	100.0	100	100.0	30
M2 hypocone	2–5/0–5	66.7	18	68.0	25	79.1	43	68.6	35	89.5	38	92.1	63	89.2	111	76.5	34	85.7	21	75.8	33	93.8	16	81.8	77	80.0	25
M3 hypocone	2–5/0–5	63.6	11	43.8	16	59.1	44	50.0	20	60.0	20	73.8	42	75.4	65	76.2	21	80.0	10	46.4	28	44.4	9	60.0	40	55.0	20
M1 cusp 5	1–5/0–5	21.4	14	31.2	16	28.2	39	17.9	28	27.6	29	19.3	57	20.5	83	23.1	26	6.7	15	9.4	32	21.4	14	13.6	59	14.3	21
M2 cusp 5	1–5/0–5	61.5	13	31.8	22	34.4	32	33.3	27	14.3	28	27.7	47	35.3	68	37.5	24	17.6	17	6.7	30	13.3	15	19.4	67	50.0	20
M3 cusp 5	1–5/0–5	50.0	8	53.8	13	40.0	40	30.0	20	40.0	20	27.8	36	35.3	51	42.1	19	30.0	10	26.9	26	37.5	8	56.1	41	35.3	17
M1 Carabelli's trait	2–7/0–7	71.4	14	62.5	16	78.6	42	58.2	12	50.0	20	58.2	55	62.8	94	70.8	24	53.8	13	48.3	29	37.5	16	71.7	60	63.2	19
M2 Carabelli's trait	2–7/0–7	16.7	12	17.6	17	14.3	35	0.0	24	13.0	23	15.6	45	18.8	64	0.0	24	11.1	18	2.6	39	0.0	17	13.6	66	8.7	23
M3 Carabelli's trait	2–7/0–7	12.5	8	8.3	12	17.1	35	16.7	18	0.0	17	11.4	35	18.4	49	5.6	18	20.0	10	10.7	28	40.0	10	23.8	42	5.9	17
M1 parastyle	1–5/0–5	6.7	15	29.4	17	24.3	37	6.7	30	6.9	29	12.5	64	13.4	97	13.5	37	5.0	20	0.0	38	4.3	23	14.9	87	21.4	28
M2 parastyle	1–5/0–5	14.3	14	10.0	20	15.4	39	6.5	31	10.8	37	8.2	61	7.5	93	3.0	33	8.7	23	0.0	42	0.0	23	3.2	95	6.9	29
M3 parastyle	1–5/0–5	40.0	10	6.7	15	10.0	40	0.0	18	10.0	20	23.8	42	20.3	69	30.0	20	9.1	11	13.8	29	0.0	12	8.2	49	0.0	20
C′ root number	1/1–2	100.0	10	100.0	15	100.0	7	100.0	20	100.0	28	100.0	61	100.0	101	100.0	19	100.0	16	100.0	23	100.0	20	100.0	69	100.0	17
P3 root number	1/1–2	50.0	6	60.0	10	0.0	2	73.3	15	57.1	28	63.6	55	69.8	86	47.1	17	81.8	11	47.4	19	63.6	22	78.3	46	52.6	19
P4 root number	1/1–2	100.0	4	100.0	14	66.7	3	81.0	21	92.3	26	92.9	56	93.1	101	84.6	13	100.0	13	100.0	14	81.8	22	92.1	63	80.0	20
M1 root number	3/1–3	100.0	9	100.0	12	100.0	7	95.5	22	96.6	29	96.4	56	90.1	91	90.5	21	86.7	15	70.0	10	100.0	10	94.2	52	95.2	21
M2 root number	3/1–3	70.0	10	62.5	8	75.0	4	73.7	19	69.6	23	72.9	48	69.1	81	84.2	19	84.2	19	69.2	13	44.4	18	73.5	49	61.1	18
M3 root number	3/1–3	0.0	3	66.7	3	40.0	5	57.1	7	33.3	12	32.4	34	21.3	61	35.7	14	37.5	8	13.3	15	0.0	10	41.7	24	20.0	15
I2 peg-shaped	2/0–2	7.1	14	7.1	14	0.0	34	0.0	17	0.0	32	6.9	58	1.8	109	0.0	23	0.0	14	0.0	34	13.3	15	0.0	78	0.0	19
M3 peg-shaped	2/0–2	0.0	12	5.9	17	2.2	46	0.0	26	0.0	26	2.1	47	1.4	74	0.0	25	0.0	14	0.0	29	7.7	14	2.1	48	4.8	21

[1] Sample acronyms (LAA, LAB, etc.) are listed in Table 1.
[2] Dichotomies report the minimum degree of expression for the trait to be considered present out of all the degrees scored according to the ASU system (Turner et al., 1991). For example, 3–6/0–6 indicates that on a scale of 0–6 a trait is considered as present if it had a degree of 3 or higher recorded.
[3] DAR, distal accessory ridge.

TABLE 3. Frequency (in %) and sample size (N) of mandibular nonmetric dental traits[1]

Trait	Dichotomies[2]	LAA		LAB		LAC		ETB		ETC		PCB		PCC		CAA		CAB		CAC		SUL		SAN		MON	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
I2 shovel shape	2–3/0–3	33.3	6	0.0	11	0.0	17	0.0	17	0.0	26	3.6	56	2.4	85	0.0	19	0.0	8	0.0	41	0.0	19	4.1	49	8.3	12
C DAR[3]	2–5/0–5	23.1	13	0.0	14	30.6	36	25.0	20	10.0	30	17.5	63	13.5	104	12.0	25	21.4	14	10.0	30	18.8	16	32.2	59	9.5	21
P3 cusp number	2–9/0–9	12.5	16	5.6	18	14.6	41	2.9	34	20.8	48	12.9	70	19.5	128	18.8	32	40.0	20	18.8	48	25.9	27	24.5	94	20.0	25
P4 cusp number	2–9/0–9	50.0	12	41.7	12	54.3	35	24.0	25	39.4	33	43.8	48	46.2	65	65.0	20	58.3	12	37.8	37	58.3	12	62.7	59	36.8	19
M1 groove pattern	Y/Y, X, +	85.7	14	85.7	14	80.6	36	80.6	31	77.4	31	85.9	71	84.5	97	88.6	35	73.3	15	63.6	22	68.8	16	88.7	53	65.4	26
M2 groove pattern	Y/Y, X, +	26.7	15	44.4	18	27.8	36	33.3	36	19.6	51	28.1	64	23.6	110	39.4	33	23.5	17	15.2	33	13.6	22	12.7	63	16.0	25
M3 groove pattern	Y/Y, X, +	28.6	14	21.4	14	18.4	38	33.3	27	18.4	38	33.3	42	35.4	65	47.8	23	0.0	7	4.5	22	20.0	10	20.8	53	25.0	20
M1 cusp number	6/4–6	0.0	13	6.2	14	8.1	34	3.2	31	2.2	45	2.3	44	3.2	93	12.1	33	0.0	16	0.0	25	9.1	22	1.4	69	0.0	23
M2 cusp number	4/4–6	66.7	12	93.8	16	84.4	32	86.7	30	81.8	44	78.9	57	80.6	103	81.5	27	81.2	16	84.4	32	68.4	19	64.2	53	83.3	24
M3 cusp number	4/4–6	33.3	15	50.0	14	45.9	37	59.3	27	50.0	34	56.1	41	40.0	65	50.0	22	54.5	11	43.5	23	58.3	12	28.6	56	42.1	19
M1 deflecting wrinkle	2–3/0–3	12.5	8	10.0	10	10.0	20	0.0	15	12.5	8	11.4	35	15.6	45	21.1	19	0.0	5	25.0	8	11.1	9	5.0	20	12.5	8
M1 trigonid crest	1/0–1	0.0	9	7.7	13	6.7	30	5.9	17	7.7	13	4.3	46	11.1	63	0.0	26	0.0	8	16.7	12	8.3	12	2.9	35	0.0	19
M1 protostylid	1–7/0–7	81.8	11	85.7	14	74.2	31	62.5	24	48.5	33	74.5	51	75.3	81	65.4	26	63.6	11	10.5	38	58.8	17	65.9	44	93.8	16
M1 protostylid	2–7/0–7	36.4	11	14.3	14	22.6	31	8.3	24	0.0	33	29.4	51	27.2	81	19.2	26	0.0	11	5.3	38	23.5	17	15.9	44	18.8	16
M2 protostylid	1–7/0–7	72.7	11	53.8	13	74.1	27	73.9	23	37.1	35	75.0	32	63.3	60	86.4	22	36.4	11	18.9	37	35.7	17	53.5	43	64.7	17
M2 protostylid	2–7/0–7	45.5	11	23.1	13	48.1	27	8.7	23	2.9	35	28.1	32	20.0	60	50.0	22	18.2	11	2.7	37	28.6	17	25.6	43	35.3	17
M3 protostylid	1–7/0–7	81.8	11	83.3	12	78.1	32	63.3	19	53.8	26	83.3	36	77.5	40	76.5	17	57.1	7	34.6	26	36.4	11	69.8	43	64.3	14
M3 protostylid	2–7/0–7	72.7	11	58.3	12	62.5	32	47.4	19	38.5	26	69.4	36	67.5	40	58.8	17	42.9	7	26.9	26	27.3	11	65.1	43	57.1	14
M2 cusp 5	3–5/0–5	16.7	12	0.0	16	6.5	31	6.9	29	7.5	40	11.3	53	11.5	96	11.5	26	18.8	16	10.0	30	16.7	18	25.0	52	8.3	24
M3 cusp 5	3–5/0–5	38.5	13	38.5	13	48.6	37	32.0	25	38.7	31	33.3	39	50.9	57	35.0	20	44.4	9	52.2	23	36.4	11	63.6	55	57.9	19
M1 cusp 7	1–4/0–4	0.0	15	0.0	15	25.0	40	6.5	31	4.1	49	5.6	72	14.5	110	2.7	37	5.6	18	3.7	27	15.0	20	12.5	64	3.8	26
M2 cusp 7	1–4/0–4	0.0	13	0.0	16	2.9	34	3.1	32	2.0	51	1.7	58	1.0	99	0.0	33	0.0	16	0.0	34	5.9	17	1.5	66	0.0	25
M3 cusp 7	1–4/0–4	7.7	13	0.0	12	5.4	37	3.8	26	0.0	31	0.0	36	3.6	56	11.1	18	10.0	10	4.8	21	0.0	11	2.0	51	5.3	19
M1 root number	3/1–3	0.0	6	0.0	8	0.0	4	0.0	19	0.0	31	0.0	40	0.0	55	0.0	17	0.0	10	0.0	17	0.0	16	0.0	42	0.0	14
M2 root number	1/1–3	11.1	9	33.3	6	0.0	4	9.5	21	14.7	34	17.9	39	10.9	55	21.1	19	16.7	6	11.1	9	62.5	16	9.3	43	8.3	12
M3 root number	1/1–3	28.6	7	28.6	7	0.0	3	10.0	10	41.2	17	32.1	28	32.6	43	18.2	11	28.6	7	30.0	10	100.0	7	23.5	34	10.0	10

[1] Sample acronyms (LAA, LAB, etc.) are listed in Table 1.
[2] Dichotomies report the minimum degree of expression for the trait to be considered present, out of all the degrees scored according to the ASU system (Turner et al., 1991). For example, 3–6/0–6 indicates that on a scale of 0–6 a trait is considered as present if it had a degree of 3 or higher recorded.
[3] DAR, distal accessory ridge.

TABLE 4. Expression count frequencies (in %) and sample size (N) for maxillary nonmetric dental traits[1]

	LAA		LAB		LAC		ETB		ETC		PCB		PCC		CAA		CAB		CAC		SUL		SAN		MON	
Trait	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
I1 shovel shape	22.2	9	22.2	6	23.7	19	22.2	6	20.5	13	20.3	37	22.6	56	25.7	13	11.1	6	10.5	19	12.5	12	17.8	31	25.0	10
I2 shovel shape	31.4	10	41.1	8	22.7	29	22.2	9	26.5	21	26.2	48	26.2	83	19.9	18	41.5	11	24.8	23	17.2	10	20.0	53	24.5	14
I1 double shoveling	6.2	8	3.3	5	6.2	19	11.1	6	12.1	11	7.3	32	2.4	41	6.0	14	2.4	7	3.2	21	12.5	12	1.7	30	0.0	9
I2 double shoveling	3.7	9	7.1	7	2.9	23	0.0	10	0.9	19	2.5	34	2.9	58	2.6	19	1.9	9	1.3	25	3.0	11	1.4	46	0.0	14
I1 tuberculum dentale	37.5	12	28.6	7	44.8	19	26.4	12	25.4	21	38.5	42	31.1	73	30.4	17	33.3	7	6.9	24	20.2	15	38.5	39	39.3	14
I2 tuberculum dentale	46.3	9	28.3	7	46.2	26	25.0	10	31.2	23	41.9	45	38.3	80	40.0	20	30.8	13	16.7	25	35.0	10	27.0	50	43.1	17
C tuberculum dentale	46.2	13	34.6	13	56.0	39	47.4	19	35.8	27	43.8	46	30.7	88	35.6	22	41.7	12	22.6	31	16.7	14	34.7	60	43.5	23
C DAR[2]	17.8	9	32.5	8	40.7	27	41.8	11	41.7	12	42.7	37	37.3	59	50.0	14	40.0	5	49.3	15	41.8	11	43.4	35	30.0	14
M1 metacone	81.6	19	79.1	24	76.9	54	80.7	39	80.2	43	80.7	96	78.6	160	81.5	45	81.9	23	81.1	38	78.6	29	80.0	107	81.7	31
M2 metacone	79.4	21	70.7	25	73.9	46	74.6	38	75.6	41	73.6	72	70.4	125	72.1	37	74.3	24	71.0	42	73.2	26	72.2	99	70.1	29
M3 metacone	72.2	12	71.6	17	73.9	44	66.7	23	84.0	25	72.9	48	73.0	79	71.7	23	74.4	13	75.6	30	69.7	12	68.3	41	65.8	20
M1 hypocone	73.2	18	75.8	22	71.8	52	68.8	39	73.7	43	74.8	94	75.2	152	75.4	42	75.8	22	77.5	37	71.4	28	76.3	100	75.0	30
M2 hypocone	60.2	18	56.0	25	62.4	43	45.7	35	67.6	38	66.7	63	64.7	111	53.5	34	60.3	21	59.6	33	58.3	16	58.5	77	56.0	25
M3 hypocone	40.9	11	27.1	16	44.7	44	29.2	20	40.8	20	47.2	42	52.1	65	56.4	21	48.3	10	33.9	28	24.1	9	39.2	40	30.3	20
M1 cusp 5	10.0	14	11.2	16	10.3	39	6.4	28	11.7	29	10.5	57	9.4	83	10.0	26	2.7	15	3.8	32	5.7	14	5.1	59	5.7	21
M2 cusp 5	26.2	13	14.5	22	13.1	32	13.3	27	8.6	28	13.6	47	17.1	68	15.8	24	8.2	17	3.3	30	4.0	15	6.9	67	30.0	20
M3 cusp 5	30.0	8	21.5	13	21.0	40	14.0	20	24.0	20	18.3	36	20.4	51	22.1	19	22.0	10	17.7	26	27.5	8	33.7	41	28.2	17
M1 Carabelli's trait	40.8	14	42.9	16	53.0	42	46.7	12	35.7	20	43.4	55	43.6	94	38.7	24	24.2	13	24.6	29	25.0	16	40.2	60	30.1	19
M2 Carabelli's trait	6.0	12	6.7	17	9.4	35	1.2	24	6.8	23	10.2	45	10.0	64	2.4	24	4.0	18	4.4	39	0.0	17	8.4	66	5.6	23
M3 Carabelli's trait	8.9	8	4.8	12	12.2	35	12.7	18	1.7	17	9.8	35	14.9	49	4.0	18	11.4	10	8.7	28	21.4	10	17.3	42	3.4	17
M1 parastyle	2.7	15	11.8	17	9.2	37	4.0	30	2.1	29	5.0	64	5.4	97	5.4	37	2.0	20	0.0	38	1.7	23	4.6	87	7.9	28
M2 parastyle	8.6	14	4.0	20	5.6	39	3.2	31	4.9	37	3.0	61	3.7	93	1.2	33	4.3	23	0.0	42	0.0	23	1.7	95	2.1	29
M3 parastyle	18.0	10	2.7	15	6.0	40	0.0	18	2.0	20	11.0	42	7.8	69	17.0	20	3.6	11	9.7	29	0.0	12	3.7	49	0.0	20
C root number	100.0	10	100.0	15	100.0	7	100.0	20	100.0	28	100.0	61	100.0	101	100.0	19	100.0	16	100.0	23	100.0	20	100.0	69	100.0	17
P3 root number	50.0	6	60.0	10	0.0	2	73.7	15	57.1	28	63.6	55	69.8	86	47.1	17	81.8	11	47.4	19	63.6	22	78.3	46	52.6	19
P4 root number	100.0	4	100.0	14	66.7	3	81.0	21	92.3	26	92.9	56	93.1	101	84.6	13	100.0	13	100.0	14	81.8	22	92.1	63	80.0	20
M1 root number	100.0	9	100.0	12	100.0	7	98.5	22	98.9	29	98.8	56	96.0	91	96.8	21	95.6	15	90.0	10	100.0	10	98.1	52	98.4	21
M2 root number	86.7	10	75.0	8	91.7	4	87.7	19	84.1	23	88.2	48	84.8	81	91.2	19	93.0	19	84.6	13	70.4	18	88.9	49	83.3	18
M3 root number	55.6	3	60.0	3	0.0	5	73.7	7	57.1	12	63.6	34	69.8	61	47.1	14	81.8	8	47.4	15	63.6	10	78.3	24	52.6	15
I2 peg-shaped	7.1	14	14.3	14	4.4	34	2.9	17	1.6	32	9.5	58	4.6	109	2.2	23	3.6	14	4.4	34	16.7	15	1.9	78	0.0	19
M3 peg-shaped	4.2	12	11.8	17	6.5	46	3.8	26	1.9	26	4.3	47	2.7	74	4.0	25	3.6	14	0.0	29	7.7	14	7.3	48	4.8	21

[1] Sample acronyms (LAA, LAB, etc.) are listed in Table 1.
[2] DAR, distal accessory ridge.

TABLE 5. *Expression count frequencies (in %) and sample size (N) for mandibular nonmetric dental traits*[1]

	LAA		LAB		LAC		ETB		ETC		PCB		PCC		CAA		CAB		CAC		SUL		SAN		MON	
Trait	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
I2 shovel shape	38.9	6	18.2	11	19.6	17	17.6	17	11.5	26	17.2	56	17.6	85	19.3	19	8.3	8	0.0	41	9.8	19	12.9	49	30.5	12
C DAR[2]	10.8	13	0.0	14	18.9	36	12.0	20	7.3	30	11.4	63	6.3	104	5.6	25	12.9	14	5.3	30	11.2	16	19.0	59	5.7	21
P3 cusp number	4.9	16	5.6	18	5.7	41	1.0	34	10.6	48	6.0	70	9.5	128	7.6	32	20.0	20	10.6	48	12.3	27	8.9	94	7.5	25
P4 cusp number	16.7	12	15.7	12	23.5	35	10.2	25	17.2	33	19.2	48	18.6	65	37.2	20	22.2	12	14.7	37	26.8	12	24.1	59	11.7	19
M2 cusp number	88.9	15	97.9	18	93.8	36	95.6	36	93.9	51	91.8	64	92.9	110	93.8	33	93.8	17	94.8	33	87.7	22	87.4	63	94.5	25
M3 cusp number	75.6	14	78.6	14	75.7	38	86.4	27	81.4	38	80.5	42	76.4	65	80.3	23	81.8	7	78.3	22	86.1	10	70.8	53	73.7	20
M1 deflecting wrinkle	12.5	8	13.3	10	10.0	20	4.4	15	12.5	8	14.3	35	16.3	45	28.0	19	0.0	5	25.0	8	14.8	9	6.7	20	8.3	8
M1 protostylid	18.2	11	14.3	14	13.8	31	14.9	24	6.9	33	14.9	51	16.4	81	14.3	26	9.1	11	3.4	38	11.8	17	13.0	44	16.1	16
M2 protostylid	20.8	11	13.2	13	19.1	27	11.8	23	5.7	35	16.5	32	12.2	60	19.5	22	9.1	11	5.0	37	10.2	17	13.0	43	14.3	17
M3 protostylid	51.9	11	40.5	12	42.4	32	37.6	19	28.0	26	50.0	36	46.1	40	30.3	17	28.6	7	14.8	26	16.9	11	40.2	43	28.6	14
M2 cusp 5	15.0	12	2.5	16	6.5	31	7.6	29	7.5	40	10.9	53	10.6	96	11.5	26	16.2	16	7.3	30	16.7	18	21.5	52	10.0	24
M3 cusp 5	36.9	13	30.8	13	41.6	37	26.4	25	33.5	31	31.3	39	44.2	57	37.0	20	44.4	9	46.1	23	32.7	11	58.5	55	47.4	19
M1 cusp 7	0.0	15	0.0	15	15.5	40	2.6	31	1.2	49	3.9	72	8.4	110	1.6	37	5.6	18	3.7	27	10.0	20	8.1	64	1.5	26
M2 cusp 7	0.0	13	0.0	16	1.2	34	0.6	32	0.4	51	0.7	58	0.4	99	0.0	33	0.0	16	0.0	34	2.4	17	0.6	66	0.0	25
M3 cusp 7	3.1	13	0.0	12	2.2	37	0.8	26	0.0	31	0.0	36	2.5	56	10.0	18	8.0	10	2.9	21	0.0	11	1.6	51	4.2	19
M1 root number	66.7	6	62.5	8	58.4	4	66.7	19	67.8	31	66.7	40	67.3	55	66.7	17	63.4	10	66.7	17	66.7	16	67.5	42	64.3	14
M2 root number	70.4	9	77.8	6	66.7	4	69.9	21	71.6	34	72.7	39	70.3	55	73.7	19	72.2	6	66.7	9	87.5	16	68.2	43	69.5	12
M3 root number	76.2	7	76.2	7	55.6	3	70.0	10	80.4	17	75.0	28	76.8	43	69.7	11	76.2	7	76.7	10	100.0	7	71.6	34	70.0	10

[1] Sample acronyms (LAA, LAB, etc.) are listed in Table 1.
[2] DAR, distal accessory ridge.

TABLE 6. Comparative descriptive statistics of the bucco-lingual diameter for all teeth[1]

Maxillary dentitions

	I1			I2			C			P3			P4			M1			M2			M3		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
CAA	21	7.01	0.441	20	6.15	0.516	26	8.08	0.731	30	8.66	0.616	27	8.79	0.596	36	11.17	0.614	34	11.05	0.701	22	10.18	0.849
CAB	35	7.20	0.404	38	6.43	0.525	40	8.37	0.502	47	8.84	0.531	43	9.13	0.651	45	11.33	0.630	44	11.00	0.746	23	10.73	0.882
CAC	63	7.07	0.380	80	6.30	0.463	97	8.23	0.501	104	8.76	0.563	95	8.95	0.566	99	11.19	0.590	98	11.11	0.783	58	10.43	0.984
ETB	19	7.21	0.425	18	6.57	0.590	27	8.22	0.552	39	8.85	0.571	39	9.11	0.653	35	11.40	0.563	39	11.40	0.754	30	10.68	1.296
ETC	25	7.06	0.539	31	6.13	0.510	35	8.16	0.645	41	8.76	0.611	36	9.00	0.602	37	11.45	0.543	37	11.43	0.847	19	10.68	1.123
LAA	13	7.19	0.454	12	6.37	0.436	14	8.20	0.602	14	8.89	0.466	17	8.88	0.499	15	11.23	0.583	17	11.53	0.518	11	10.28	0.908
LAB	7	7.05	0.463	10	6.10	0.209	12	8.10	0.746	21	8.57	0.577	17	8.92	0.471	16	11.36	0.648	21	11.21	0.699	15	10.59	1.105
LAC	3	7.37	0.252	5	6.58	0.472	6	8.21	0.504	5	8.85	0.173	4	9.28	0.366	7	11.30	0.382	5	11.34	0.776	5	10.16	1.595
MON	20	7.28	0.393	20	6.52	0.442	23	8.42	0.573	27	8.94	0.596	27	9.04	0.492	28	11.45	0.750	27	11.62	0.817	20	10.99	1.039
PCB	65	7.14	0.412	59	6.20	0.433	68	8.24	0.582	67	8.75	0.564	61	9.01	0.576	72	11.41	0.623	65	11.69	0.799	48	10.74	0.920
PCC	114	6.96	0.373	115	6.19	0.433	129	8.13	0.660	117	8.77	0.608	128	8.91	0.596	138	11.34	0.590	118	11.27	0.702	74	10.71	0.830
SAN	52	7.11	0.426	72	6.29	0.364	95	8.45	0.569	83	8.77	0.608	90	9.13	0.680	88	11.57	0.586	90	11.54	0.676	45	10.92	1.028
SUL	12	7.10	0.221	9	6.27	0.403	17	8.03	0.477	18	8.80	0.547	11	8.78	0.314	13	11.45	0.461	12	11.54	0.881	7	10.56	0.624

Mandibular dentitions

	I1			I2			C			P3			P4			M1			M2			M3		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
CAA	20	5.82	0.378	29	6.13	0.302	28	7.49	0.660	32	7.37	0.552	31	7.83	0.624	36	10.29	0.508	31	9.73	0.604	20	9.52	0.792
CAB	41	6.07	0.446	43	6.53	0.405	50	7.81	0.580	50	7.59	0.581	47	8.06	0.666	51	10.47	0.624	46	9.91	0.732	35	9.75	0.805
CAC	96	5.94	0.375	113	6.30	0.355	126	7.72	0.560	129	7.53	0.475	119	8.07	0.498	112	10.41	0.487	112	9.94	0.542	75	9.66	0.657
ETB	23	5.82	0.326	27	6.23	0.359	39	7.70	0.591	47	7.55	0.495	42	8.11	0.614	38	10.47	0.454	35	9.99	0.467	33	9.56	0.571
ETC	25	5.92	0.426	40	6.22	0.376	47	7.65	0.605	54	7.53	0.522	49	8.20	0.509	53	10.34	0.521	50	9.87	0.606	40	9.57	0.762
LAA	9	5.84	0.533	11	6.27	0.424	15	7.60	0.520	16	7.60	0.524	15	8.32	0.491	15	10.45	0.439	15	10.05	0.623	15	9.43	0.708
LAB	7	5.57	0.280	11	6.13	0.331	13	7.31	0.516	15	7.52	0.475	16	7.95	0.512	13	10.17	0.412	15	9.87	0.628	14	9.496	0.705
LAC	6	6.07	0.320	5	6.50	0.481	10	7.89	0.722	7	7.56	0.416	6	8.40	0.381	6	10.34	0.206	6	10.17	0.282	6	9.45	0.698
MON	22	5.86	0.413	29	6.36	0.405	30	7.77	0.574	29	7.56	0.653	25	8.05	0.550	27	10.43	0.463	25	9.98	0.539	19	9.72	0.651
PCB	70	5.82	0.362	86	6.26	0.340	81	7.67	0.532	83	7.50	0.425	69	8.04	0.475	80	10.40	0.512	69	9.99	0.553	45	9.64	0.708
PCC	134	5.86	0.381	147	6.25	0.337	162	7.60	0.660	155	7.48	0.467	136	8.02	0.505	131	10.33	0.587	124	9.91	0.544	78	9.59	0.613
SAN	63	5.95	0.347	83	6.35	0.336	100	7.77	0.532	100	7.59	0.559	83	8.27	0.572	66	10.59	0.546	75	10.25	0.542	58	9.70	0.671
SUL	19	5.67	0.266	27	6.10	0.315	25	7.44	0.463	26	7.44	0.394	19	7.95	0.387	18	10.35	0.418	22	9.92	0.551	11	9.51	0.735

[1] Sample acronyms (LAA, LAB, etc.) are listed in Table 1.

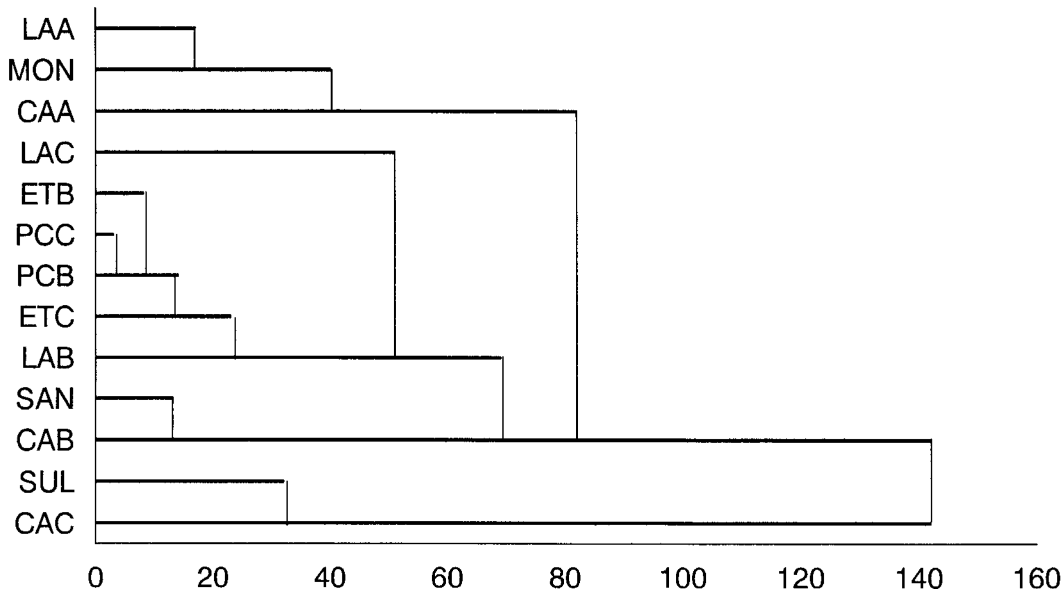

Fig. 2. Dental nonmetric traits. Dendrogram depicting the relationships of 13 samples based on the first five axes.

The next six samples which cluster together show the same sort of randomness with respect to time and geography. In fact, in most instances areas that contain more than one time period rarely show a close relationship within the time period themselves. For example, even though CAA is clustered with CAC, they are both very distant from the chronologically intermediate CAB sample. A similar lack of any consistent pattern is evidenced when the two-axis analysis is considered (Fig. 5).

DISCUSSION

Three main conclusions can be drawn from this preliminary study of Iron Age populations in central-southern Italy: 1) the samples appear to cluster more according to chronological than geographical similarity; 2) there is a clustering between the Piceni and Etruscans located in the northern part of this study but on opposite sides of the mountains as well as a close association between the C horizons of Sulmona and Campania and between the B horizons of Sanniti and Campani (with, once again, each cluster containing samples from both sides of the mountains); and 3) discrete dental traits appear to be more useful in assessing population affinities than metric dental traits.

Regarding the first conclusion, it was hypothesized that the Apennine mountain chain might provide a significant geographical barrier for population movements and, as a result, that populations on each side of the mountains would display greater biological affinities toward each other than to those groups on opposite sides. This expectation, however, is not observed. Instead, the three Archaic groups (Latini, Campani, Montani) are closely related and thus perhaps can be viewed as the basic foundation for all later populations. In the middle and late periods, this general pattern of chronological rather than geographical affinities continues.

These results may not be surprising, however, given recent skeletal, dental, and genetic studies which have opened interesting windows on the biological history of Italy. Biological continuity in the Italian peninsula from the Pre-Roman period to the present is suggested by the distribution of

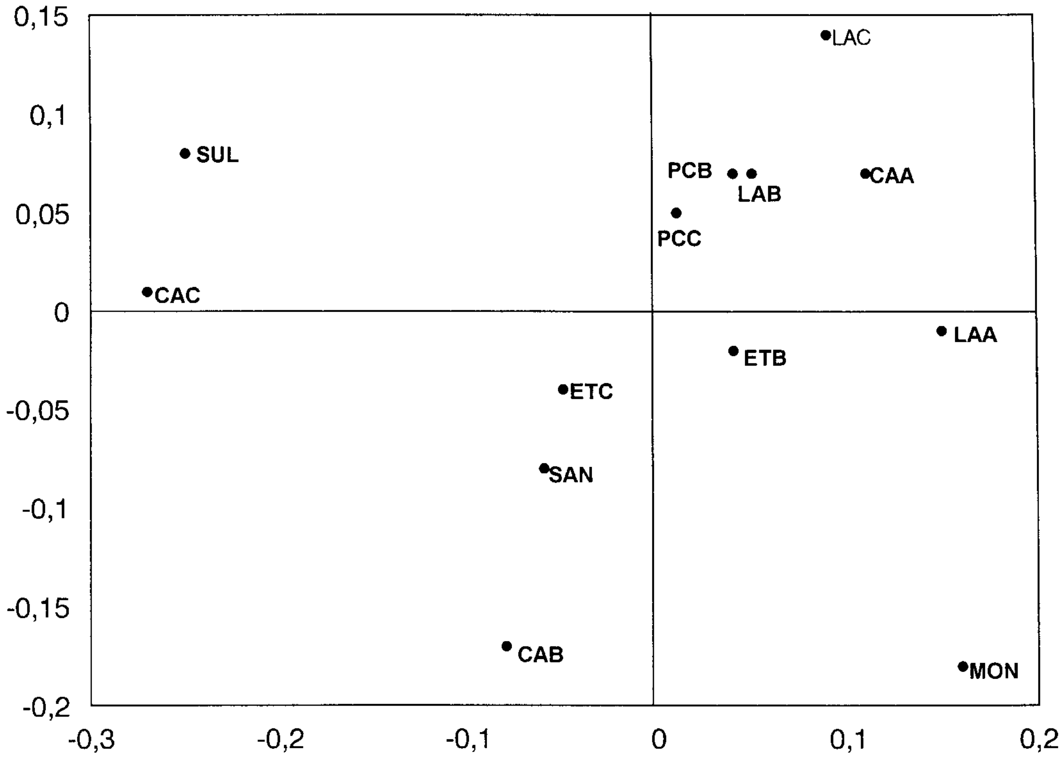

Fig. 3. Factor correspondence analysis of dental nonmetric traits, first two axes, depicting relationships of 13 samples.

genetic markers from living population samples (Piazza et al., 1988; Piazza, 1991; Cavalli-Sforza et al., 1993). Similarly, relative homogeneity among ancient Italian populations was found through the analysis of cranial metric and nonmetric traits (Vecchi, 1969; Cresta and Vecchi, 1969). More recently, multivariate analyses applied to metric and nonmetric cranial and skeletal traits have confirmed the possible homogeneity among the Italian populations from the early Neolithic to the early historic times (Borgognini-Tarli and Mazzotta, 1986; Borgognini-Tarli, 1992) as well as during the Bronze Age and the Iron Age (Gualdi-Russo and Brasili-Gualandi, 1977–1979). Cranial and postcranial metric and nonmetric traits have also been analyzed on central-southern Italian samples from the Eneolithic and Bronze Age (Pacciani et al., 1982) and from the Iron Age and the Roman period (Coppa et al., 1987; Mancinelli et al., 1993). Thus, it is possible that the data are reflecting a relatively homogenous, large population changing through time rather than smaller isolates evolving more independently of one another.

With respect to the second conclusion, on a finer level and as evidenced in the discrete traits, there appears to be a close clustering between the Piceni and Etruscans located in the northern part of this study but on opposite sides of the mountains. In addition, there was a close association between the C horizons of Sulmona and Campania and the B horizons of Sanniti and Campani. Interestingly, although such results contradict the hypothesis of the mountains being a significant geographical barrier between these groups, they are in agreement with existing archaeological evidence. Casi et al. (1995) and D'Ercole (in press a) cite that the typical shape of chamber tombs of the Etruscan area (west side) has been found in the

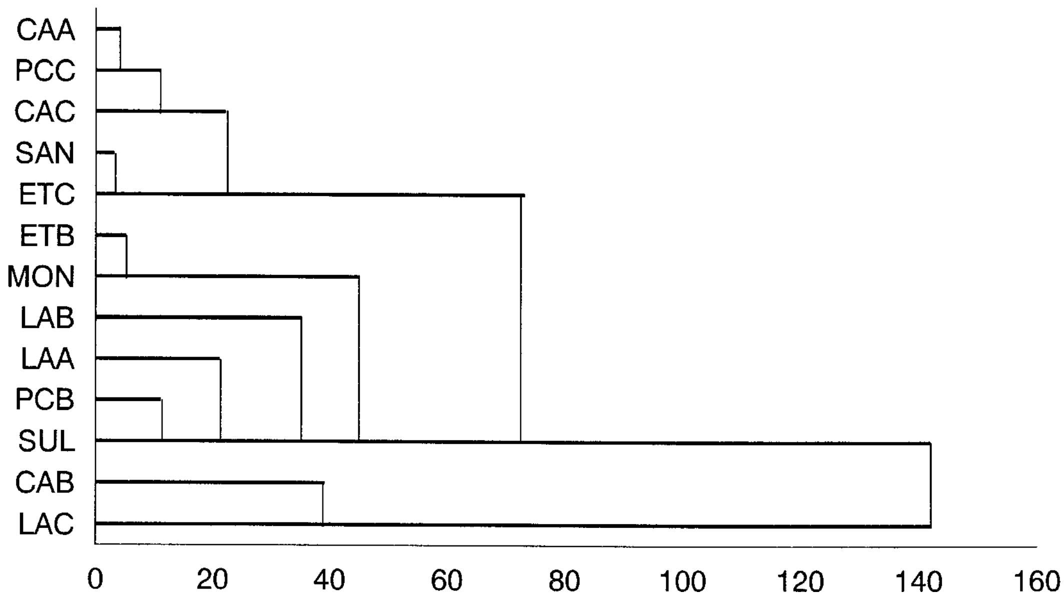

Fig. 4. Dental metric traits. Dendrogram depicting the relationships of 13 samples based on the first five axes.

necropolis of Corropoli (east side). Bronze-made razor blades and rings (D'Ercole, 1991), bronze swords (Bianco-Peroni, 1970) and cups, plates, and jugs (D'Ercole, in press b) typical of the west side (Latium and Etruscan area) have been found in the necropolis of Campovalano (which is part of the Piceni group). Moreover, Santoro (1973), Cristofani-Martelli (1977), Ruggeri-Giove and Baldelli (1982), and Torelli (1987) report cultural affinities between the Piceni and the northern part of Latium, while Zanco (1974) noted the same regarding the Etruscans and the Piceni. In the southern part of the area, Parise-Badoni and Ruggeri-Giove (1981) found cultural relationships particularly between the Sanniti and the Campani. Thus, population affinities based upon archaeological data suggest a close association between the Etruschi and Piceni populations and between Campani and Sanniti and nearby Sulmona. These are the same clusters observed after the earliest (A) horizon in the discrete dental data.

The third conclusion, that discrete dental traits appear to be more useful in assessing population affinities than metric dental traits, is not surprising. This may be caused by a variety of factors. For example, discrete features may be under tighter genetic control, whereas dental metrics may vary more and evolve more rapidly as a result of differing environmental and dietary factors in various regions. In addition, the discrete dental data are comprised of a large number (59) of variables used as indicators of biological relationships as opposed to basic breadth measurements which comprise the metric dental set. Thus, we would expect the discrete dental data set to have greater discriminatory power. Also, Macchiarelli and Sperduti (1994), in a diachronic study of dental reduction in Italy from the Paleolithic to modern times, note that during the first millennium BC no particular patterns of either increase or decrease exist. The sort of randomness found in our analysis of dental metric traits reflects that proposed by Macchiarelli and other researchers who carried out their studies on the basis of skeletal morphological and morphometric traits.

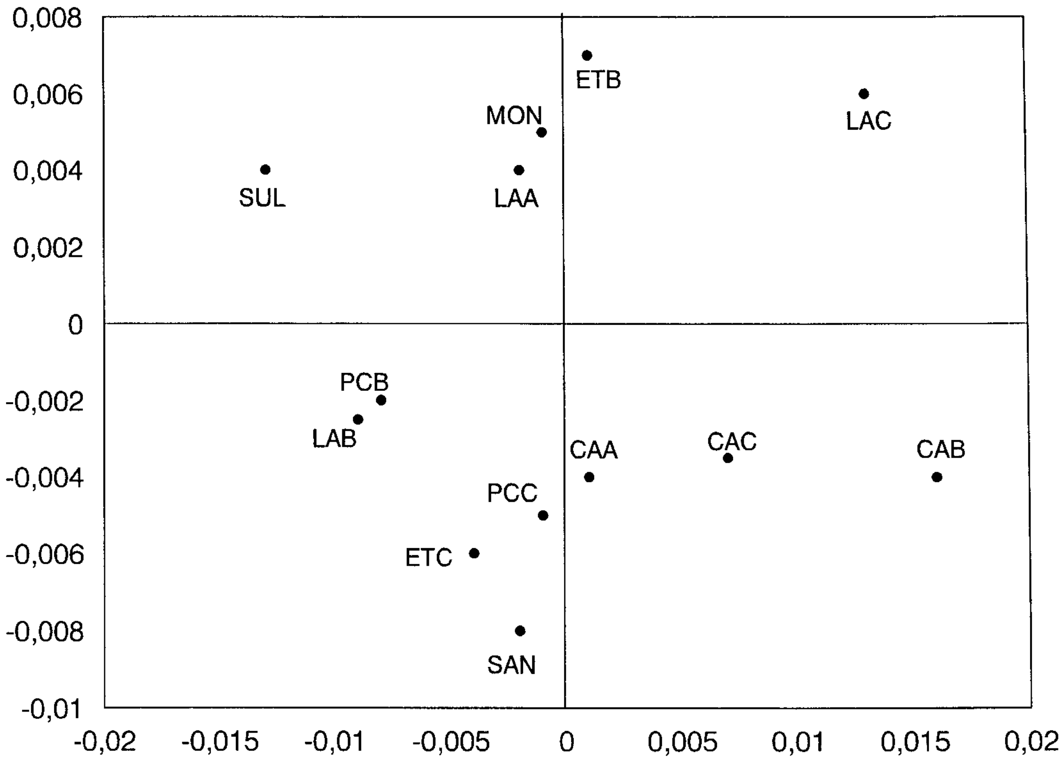

Fig. 5. Factor correspondence analysis of dental metric traits, first two axes, depicting relationships of 13 samples.

CONCLUSIONS

It was hypothesized that the Apennine mountain chain might provide a significant geographical barrier for population movement and, as a result, that populations on each side of the mountains would display greater biological affinities toward each other than to those groups on opposite sides. This expectation, however, is not observed. Instead, the samples appear to cluster more on the basis of time than geography. It appears that the three Archaic groups (Latini, Campani, Montani) are closely related and thus perhaps can be viewed as the basic foundation for all later populations. In the middle and late periods, this general pattern of chronological rather than geographical affinities continues.

Although the sample sizes used in this study are relatively large, in many ways this study must still be characterized as preliminary because of the vast amount of data that is currently becoming available in Italy due to ongoing excavations and analyses. It is our hope that this research represents just the beginning to a better comprehension of the complexity of the biological and cultural dynamics of Italian populations during recent millennia.

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